

APPLICATION

FOR

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TITLE: A SCHEME FOR SPREAD SPECTRUM MULTIPLE
ACCESS CODING

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A SCHEME FOR SPREAD SPECTRUM MULTIPLE ACCESS CODING

This application is a continuation of PCT/CN98/00151
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Field of the Invention

The invention relates to a spread spectrum and digital
multiple access wireless communications scheme, especially
to a spread spectrum multiple access coding scheme applied
in any digital communications system employing code
division multiple access ("CDMA") and spread spectrum
radio.

Background of the Invention

With the coming of the information society and the
personal communications era, the demand on wireless
communications technology is growing rapidly, but the
frequency resources are very limited. A code division
multiple access ("CDMA") technique is the only efficient
way to resolve the contradiction between limited frequency
resources and demand for high capacity. The capacity of
traditional wireless multiple access techniques, e.g.,
frequency division multiple access ("FDMA") and time
division multiple access ("TDMA"), is fixed once designed,
i.e., additional users can not be introduced beyond that
capacity limit. But CDMA is different in that the capacity
is only limited by the interference level and thus results

in the advantages of large capacity and soft capacity. That is, introducing an additional user is not precluded even though it may lead to reduced signal-to-noise ratio and quality of communications. So, unlike FDMA or TDMA, an insurmountable capacity limit does not exist.

As is noted above, the capacity of a CDMA system is interference-limited, thus, whether the interference level can be controlled or not determines the system's quality. Generally, the interference in the system consists of four parts: the first is local noise, which may be reduced by applying a low noise amplifier; the second is multiple access interference ("MAI"), which comes from the other users in the system; the third is inter-code or inter-symbol interference ("ISI"); and the fourth is neighboring cell or adjacent channel interference ("ACI"). By employing well-designed multiple access codes, MAI, ISI and ACI can be reduced or even eliminated.

In any CDMA system, each user has a specific spread spectrum multiple access code for identification. Furthermore, to reduce the users' mutual interference, the spread spectrum multiple access codes must be orthogonal to each other. Indeed, orthogonality between any two users' signals is always required in any multiple access system. Given that the channel is an ideal linear time-invariant system, and accurate synchronization is realized in the system, then orthogonality between any two users' signals